

CALIFORNIA ENVIRONMENTAL QUALITY ACT

INITIAL STUDY

The Department of Toxic Substances Control (DTSC) has completed the following Initial Study for this project in accordance with the California Environmental Quality Act (§ 21000 et seq., California Public Resources Code) and implementing Guidelines (§15000 et seq., Title 14, California Code of Regulations).

I. PROJECT INFORMATION

1.1 Project Name: The Dow Chemical Company, Pittsburg, California

1.2 Project Description:

The project is issuance of a Permit by DTSC for continued operation of hazardous waste treatment units and storage units. The treatment units are two boiler & industrial furnaces (BIF or halogen acid furnaces (HAF)) and associated hydrochloric acid recovery and air pollution control systems. These two HAF units and associated units have BIF interim status authorization under DTSC. These HAF units also currently operate under their respective Bay Area Air Quality Management District (BAAQMD) permits that contain specific conditions and limitations.

1.3 Site Location:

The Dow Pittsburg facility is located at the north end of Loveridge Road, Pittsburg, in Contra Costa County. The site is bounded by the San Joaquin River's New York Slough to the north, the Pittsburg-Antioch Highway to the South, Loveridge Road to the west, and undeveloped and commercial land to the east of Loveridge Road. The industrial part of the site consists of approximately 450 acres, about half of that are undeveloped. In addition, Dow owns 200 acres of land which have been restored as a wetlands preserve and wildlife habitat and another 350 acres of open land to the east of the facility. The area surrounding Dow's Pittsburg facility is heavily industrialized and has a long history of industrial development. Relatively large industrial facilities within one mile of the facility include Kemwater North America to the south, USS-POSCO Industries and the former Continental Can Company to the south and west, and the Sanitation District 7A facility located on property next to Dow to the south. In addition, the Johns Manville plant and the Pittsburg District Energy Facility is located to the west, and the Delta Energy Center is planned south of the facility on land owned by Dow. The area immediately adjacent to the facility is predominantly industrial with undeveloped industrial land and commercial uses providing a buffer between industrial activity and residential areas within the Cities of Pittsburg and Antioch. A band of light industrial/commercial development or undeveloped land separates residential areas from the industrialized areas along the waterfront. Residential portions of the Cities of Pittsburg and Antioch are located further to the southeast, south, and southwest. The nearest residences are located approximately one mile from the Pittsburg facility. The City of Pittsburg has zoned this facility for industrial use, which is consistent with both the City of Pittsburg and Contra Costa County General Plans. No agricultural activity takes places within one mile of the Pittsburg facility and there is no land under Williamson Act contract in the vicinity of the project site.

1.4 Contact Person/ Address/ Phone Number:

Waqar Ahmad, PhD, PE, REA
Hazardous Substances Engineer
Department of Toxic Substances Control

Standardized Permits and Corrective Action Branch
700 Heinz Avenue
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1.5 Facility Description:

The Dow Chemical Co. Pittsburg facility currently operates 24-hours per day, seven days per week. Operations include research and development and the manufacture of products for agricultural operations, pest control services, paper manufacturers, carpet mills, and biocides. During the manufacture of chemical products at the facility, specific liquid by-products are produced that are thermally oxidized in the halogen acid furnace (HAF) units. In addition, the HAFs are used to treat tank and process vent emissions. Aqueous hydrochloric acid (HCl) is produced as a result of thermally oxidizing the chlorinated liquids and gas streams in the HAFs. The HCl is sold as a product to various industrial customers and is used for pH control at the Brine/Condensate Plant within the Dow Chemical plant. The HAF units have been in operation for over 20 years. Both units utilize computer process controls to maintain continuous steady-state conditions. The HAF units are considered an integral part of production operations since the units are used to manufacture HCl acid product.

1.6 Hazardous Waste Generation:

The following plants and processes, all of which are located at the Dow Pittsburg facility, generate liquid hazardous wastes and gaseous process vents, which are treated by the HAF units.

Symtet Process: A variety of chlorinated pyridine products are produced by the chlorination of picolines in continuous processes. Hydrogen chloride gas and carbon tetrachloride are co-products of the chlorination reactions.

Dowicil Plant: The Dowicil plant manufactures antimicrobial products by reaction of a chlorinated alkene and an amine in a methylene chloride solvent.

Manufacturing Services: Manufacturing Services (MS) provide a variety of services for site manufacturing plants such as, operation of utilities, process water, groundwater treatment, distillation systems, and an acid production process.

Site Logistics: Site Logistics is responsible for site product storage tanks and for shipping and receiving facilities associated with these products.

Vikane Plant: The Vikane plant produces a fumigant for dry wood termite control.

Trifluoro Plant: The Trifluoro plant produces agricultural chemical intermediates used to make a commercial agricultural chemical, which is produced at another Dow site.

1.7 Regulated Hazardous Waste Management Units:

The following are regulated hazardous waste treatment units and storage units that will be authorized for continued operation under a permit issued by DTSC.

Symtet Halogen Acid Furnace (ST HAF): The ST HAF thermally treats chlorinated liquid and process vent feed streams, recovering the chloride as a hydrochloric acid product. Since the feed is approximately 65% chloride by weight, 65% of the material fed to the HAF unit is recovered as product. ST HAF unit produces hydrochloric acid from chlorinated liquids and process vent streams by thermal oxidation at temperatures between 1,000 degrees Centigrade (°C) and 1,500 °C. The thermal reactor converts the feed material to a gas stream. ST HAF treats chlorinated-hydrocarbon material at a rate of one gallon per minute. A quench unit cools the hot combustion gas from the thermal reactor.

Product hydrogen chloride and any particulate matter are removed from the combustion gas by acid absorbers and a caustic scrubber. The remaining gas stream is sent to carbon adsorbers and a catalytic reduction unit to reduce nitrogen oxides (NO_x) to molecular nitrogen (N₂). The ST HAF system is composed of (1) a feed system (storage tanks and pumps), (2) a combustion system (thermal reactor, fuel, and air supplies), and (3) an air pollution control system (acid absorption, caustic scrubbing, particulate removal and NO_x reduction systems).

Manufacturing Services Halogen Acid Furnace (MS HAF): The MS HAF thermally treats chlorinated liquid and process vent feeds, recovering the chloride as product hydrochloric acid. Since the feed is typically 60 - 90% chloride by weight, 60 - 90% of the material fed to the HAF unit is recovered as product. The thermal reactor converts the liquid feed material to a gas stream. MS HAF unit produces hydrochloric acid from chlorinated liquids and process vent streams by thermal oxidation at temperatures between 1,000 °C and 1,500 °C. MS HAF treats chlorinated-hydrocarbon material at a rate of one gallon per minute. A quench unit cools the hot combustion gas from the thermal reactor. Product hydrogen chloride and any particulate matter are removed from the combustion gas by acid absorbers and a caustic scrubber. MS HAF process is composed of (1) a feed system (storage tank, pump), (2) a combustion system (thermal reactor, fuel and air supplies), and (3) an air pollution control system (acid absorption, caustic scrubbing and vacuum systems).

Waste Storage Tanks T-501B and T-502A: Two tanks, T-501B and T-502A, store liquid hazardous waste feed material in the ST HAF tank farm area. The volume of each tank is approximately 15,000 gallons. The tanks have an expected service life of 20 years. The two tanks are heated to a minimum temperature of 120 °C by external heat exchangers to keep the contents liquid. Pumps on each tank circulate the liquid through the tanks in addition to feeding the HAF reactor. Tank instrumentation include (1) weigh cells, (2) temperature probes in the pump discharge piping, (3) pressure transmitters. The tank vent gases are piped directly to the HAF reactor.

Waste Storage Tank T-12: Tank T-12 stores liquid hazardous waste in MS HAF area. The volume of the tank is approximately 3,750 gallons. Tank instrumentation includes a liquid level indicator and a pressure transmitter. The tank vent gases are piped directly to the HAF reactor.

References:

1. "BIF Part A and Part B Permit Application for the Dow Chemical Company Halogen Acid Furnaces", December 2000, (Section 6, Waste Management Practices)

1.8 Permitting History:

Tank Storage Permit:

Dow submitted a RCRA Part A permit application in November 1980 after submitting a Notice of Hazardous Waste Activity in August 1980. On November 10, 1981, the California Department of Health Services (DHS) issued Dow an Interim Status Document (ISD). Dow submitted an initial site-wide RCRA Part B permit application on August 1, 1983.

In September 1983 the facility was issued a RCRA Hazardous Waste Facility Permit for the storage of hazardous waste at two other locations at The Dow Chemical Co. These tanks are not related to the boiler and industrial furnaces. The permit was renewed in July 1996. These facilities consist of (1) an outdoor container storage area, with a capacity of 6000 gallons, for the storage of containers up to 80 gallons in total capacity. Waste materials to be stored include chlorinated pyridines, organic solvents, paints, and oils with trace amounts of metals, (2) an aboveground storage tank, with a capacity of 10,300 gallons, for the storage of waste caustic scrubber effluent containing trace amounts of metals and organic solvents.

1.9 BIF Interim Status Authorization:

In February 1992, a BIF Part B permit application was submitted to USEPA, as required by the 1992 BIF rule promulgated by USEPA. For existing facilities like Dow, the BIF rule required pre-compliance and compliance certifications (every three years) during interim status, while a RCRA operating permit was being processed. These certifications document conformance with emission standards specified in the BIF rule (40 CFR 266.104-107). Dow submitted compliance certifications in August 1992, 1995, 1998, and 2001 for both halogen acid furnaces. In 1999, USEPA authorized DTSC as a regulatory agency for implementing BIF rule.

1.10 CEQA Compliance History:

DTSC approved the project concerning tank storage permit through a Negative Declaration in August 1996. DTSC determined that the project would not have a significant effect on the environment. The Negative Declaration was prepared pursuant to the provisions of CEQA.

References:

1. "Negative Declaration for the Dow Chemical Company, Pittsburg, July 23 1996. Confirmation of Filing on Notice of Determination for Dow Chemical Company, Pittsburg, Hazardous Waste Facility Permit, Site Number 200164.50
2. "BIF Part A and Part B Permit Application for the Dow Chemical Company Halogen Acid Furnaces", December 2000, (Appendix H, Initial Study Checklist)

1.11 RCRA Corrective Action Activities:

In 1986 the Environmental Protection Agency (EPA) prepared a Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) report that identified 25 Solid Waste Management Units (SWMUs) at the Dow Pittsburg facility. Solid waste management unit is defined as any facility equipment that handled hazardous waste or hazardous material that released or had the potential to release hazardous constituents to environmental media.

In June 1987, the San Francisco Bay Area Regional Water Quality Control Board issued Waste Discharge Requirements (WDR) Order No. 87-064 that addressed the SWMUs of potential concern in the RFA report and included a groundwater self-monitoring program. The WDR required that Dow submit and implement a plan to characterize all identified areas of potential concern for water quality and, if necessary, evaluate alternatives for remediation of these areas. Dow has submitted various reports addressing RWQCB requirements for SWMU investigations, waste characterization and mobility studies and SWMU closure plans. Much of the site investigation work is summarized in a twelve volume Remedial Feasibility Investigation and Corrective Action Program report submitted in December 1988.

In 1989 the EPA issued a 3008(h) Administrative Order under RCRA authority requiring Dow to 1) determine the nature and extent of any releases of hazardous wastes or hazardous constituents from the facility, and 2) to identify and evaluate alternatives for corrective action necessary to prevent or mitigate any migration of hazardous wastes or hazardous constituents from the facility. In August 1997, EPA issued written notice that it had terminated the 3008(h) Administrative Order and that the requirements of the Order had been incorporated into the Hazardous Waste Facility Permit issued by DTSC in August 1996. The Hazardous Waste Facility Permit in turn references Section 25204.6 of the California Health and Safety Code which grants the lead authority to RWQCB to implement and enforce the corrective action requirements of Article 6, Chapter 14, Division 4.5, Title 22 of the California Code of Regulations. Currently the RWQCB, with assistance from DTSC specialists upon request, is the sole agency overseeing corrective action at the Dow Pittsburg facility.

RCRA Facility Assessment: In August 1986, a visual site inspection was performed as part of a RCRA

Facility Assessment (RFA). The RFA report, dated September 18, 1986, identified 25 SWMUs and other areas of concern.

RCRA Facility Investigation (RFI) Summary:

In March 1987, Dow submitted a Corrective Action Program report to the RWQCB. The RCRA Facility Investigation (RFI) and revised Corrective Action Program, a Comprehensive Workplan was submitted to the RWQCB in October 1987. In late 1987, the RWQCB approved the RFI Workplan. In December 1988, Dow implemented the workplan and submitted RFI report (12-volume). In August 1990, U.S. EPA partially approved Dow's 1988 RFI Report. Additional work was required to complete Corrective Measures requirements.

RFI and Revised Corrective Action Program Report

The Dow site was divided into 9 geographically distinct work areas. This division was based on historical waste practice and chemical storing/handling data, facility land use, and the collection of new soil and groundwater data.

Corrective Measures Study Plan: In March 1989, U.S. EPA issued an Administrative Order (09-89-007) that required Dow to perform a RCRA Facility Investigation to determine the extent of any releases of hazardous wastes or hazardous constituents from the facility. The order also required Dow to perform a Corrective Measures Study (CMS) to identify and evaluate alternatives for corrective action necessary to prevent or mitigate any migration or releases of hazardous wastes or hazardous constituents at or from the facility. The U.S. EPA order identified the hazardous waste management units regulated under RCRA, including surface impoundments (Ponds A, B, C, D, E, and F), and various hazardous waste storage and treatment tanks and containers. The U.S. EPA order listed the 25 SWMUs, specified in the RFA report. These SWMUs included landfills, inactive hazardous waste trenches and various ponds. Dow submitted the draft Corrective Action Plan in October 1991.

Corrective Measures Study Report: In November 1993, Dow submitted a revised Corrective Measures Study draft report. In March 1995, Dow submitted a final CMS. CMS Report discusses various alternatives for remediation of contamination at the site. The remedy for the Dow site will include monitoring and maintenance requirements for the six closed "Solar Evaporation Ponds". The six ponds are identified as A through F. Ponds E and F were clean-closed, and all residual wastes are held in ponds A, B, C, and D.

SWMUs Currently Under Investigations under RWQCB WDR Order 98-059 (June 1998):

Hexachlorobenzene Disposal Trench (SWMU 4.12): Trench closed and final cover installed in late 1998. The final cover includes 40-mil HDPE geomembrane beneath 9 inches of soil and a 4-inch asphalt cap. The cover is sloped between 3 and 5% to promote runoff. Ongoing maintenance and monitoring is performed.

Former Outfall Pond (SWMU 4.19): The Former Outfall Pond (FOP) was closed and capped in October 2000. The final cover included a mesh geogrid covered by a 1-foot sand layer, a geosynthetic clay liner, and a vegetated soil layer. The cover is sloped to 3% to promote runoff. Ongoing maintenance and monitoring is performed by the facility.

References:

1. RFI and Corrective Action Program Report Dow Chemical Pittsburg, California, October 12, 1987.
2. Closure Plan for Class I Surface Impoundments, November 1, 1987
3. RFI and Revised Corrective Action Program Report Dow Chemical USA Pittsburg, California,

Volume 1, December 1988.

4. RFI and Revised Corrective Action Program Report, Dow Chemical USA Pittsburg, California, Volume 4, Appendix A, RWQCB Final Order, December 1988.

5. RFI and Revised Corrective Action Program Report, Dow Chemical USA Pittsburg, California, Volume 5, Appendix D, Air Quality Monitoring Reports, December 1988.

6. RFI and Revised Corrective Action Program Report, Dow Chemical USA Pittsburg, California, Volume 5, Appendix E, Brine Pond Closure Data Reports, December 1988.

7. RFI and Revised Corrective Action Program Report, Dow Chemical USA Pittsburg, California, Volume 6, Appendix F, Latex Pond Closure Data Reports, December 1988.

8. RFI and Revised Corrective Action Program Report, Dow Chemical USA Pittsburg, California, Volume 8, Appendix 8, Storm Water Evaluation Report, December 1988.

9. E-001 Pond Waste Characterization Report, February 24, 1988

10. Latex Ponds Closure Investigation Report, December 1988

11. Brine Ponds Closure - Conceptual Plan and Schedule, July 1, 1988

12. RFI Summary Document Dow Chemical USA Pittsburg, California July 10, 1990

13. Corrective Measures Study Report, The Dow Chemical Company Pittsburg, California, Volume II of III, March 8, 1995.

14. Waste Discharge Requirements Order No. 98-059, California Regional Water Quality Control Board, San Francisco Bay Region.

15. BIF Part A and Part B Permit Application for the Dow Chemical Company Halogen Acid Furnaces, December 2000, (Section 11, Corrective Action)

1.12 Public Participation Activities:

- EPA public noticed the receipt of Permit Applications for Storage and Processing of Hazardous Waste from the Dow Chemical Company, Pittsburg, California (May 1995).
- DTSC public noticed Receipt of Proposed Trial Burn Plan for Halogen Acid Furnaces from the Dow Chemical Company, Pittsburg, California (March 10, 1998).
- DTSC Public noticed Approval of Trial Burn Plan for Halogen Acid Furnaces, Dow Chemical Company, Pittsburg, California (March 19, 1999).

DTSC has not received any comments from the public during any of the above public comment periods.

The BIF permit application, trial burn, and human health risk assessment, is available for public review at:

Pittsburg Public Library
80 Power Avenue
Pittsburg, California 94565

Antioch Public Library
501 West 18th Street
Antioch, California 94509

The full administrative record is available at:

California Environmental Protection Agency
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, California 94710
(510) 540-3800

References:

1. Fact Sheet, May 1995: Public Notice Permit Applications from Dow Chemical Company for Storage and Processing of Hazardous Waste.
2. Public Notice, March 10, 1998: Receipt of Proposed Trial Burn Plan for Halogen Acid Furnaces from the Dow Chemical Company, Pittsburg, California.
3. Public Notice, March 1999: Approval of Trial Burn Plan for Halogen Acid Furnaces, Dow Chemical Company, Pittsburg, California.

II. DISCRETIONARY APPROVAL ACTION BEING CONSIDERED BY DTSC

- | | |
|--|--|
| <input type="checkbox"/> Initial Permit Issuance | <input type="checkbox"/> Removal Action Plan |
| <input checked="" type="checkbox"/> Permit Renewal | <input type="checkbox"/> Removal Action Workplan |
| <input type="checkbox"/> Permit Modification | <input type="checkbox"/> Interim Removal |
| <input type="checkbox"/> Closure Plan | <input type="checkbox"/> Other (Specify) |
| <input type="checkbox"/> Regulations | _____ |

Program/ Region Approving Project:

Standardized Permits and Corrective Action Branch
Permitting Division
Hazardous Waste Management Program
Department of Toxic Substances Control

Contact Person/ Address/ Phone Number:

Mohinder S Sandhu, Chief
700 Heinz Avenue, Suite 300
Berkeley, CA 94702
(510) 540-3974

III. ENVIRONMENTAL RESOURCES POTENTIALLY AFFECTED

The boxes checked below identify environmental resources which were found in the following ENVIRONMENTAL SETTING/IMPACT ANALYSIS section to be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact".

- | | | |
|--|--|--|
| <input type="checkbox"/> Aesthetics | <input type="checkbox"/> Hydrology and Water Quality | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Agricultural Resources | <input type="checkbox"/> Land Use and Planning | <input type="checkbox"/> Transportation and Traffic |
| <input type="checkbox"/> Air Quality | <input type="checkbox"/> Mineral Resources | <input type="checkbox"/> Utilities and Service Systems |
| <input type="checkbox"/> Biological Resources | <input type="checkbox"/> Noise | <input type="checkbox"/> Risk of Upset |
| <input type="checkbox"/> Cultural Resources | <input type="checkbox"/> Population and Housing | <input type="checkbox"/> Public Safety |
| <input type="checkbox"/> Geology And Soils | <input type="checkbox"/> Public Services | <input type="checkbox"/> Cumulative Effects |
| <input type="checkbox"/> Hazards and Hazardous Materials | | <input type="checkbox"/> <u>None of the Above</u> |

IV. ENVIRONMENTAL IMPACT ANALYSIS

The following pages provide a brief description of the physical environmental resources that exist within the area affected by the proposed project and an analysis of whether or not those resources will be potentially impacted by the proposed project. Preparation of this section follows guidance provided in DTSC's California Environmental Quality Act Initial Study Workbook [Workbook]. A list of references used to support the following discussion and analysis are contained in Attachment A and are referenced within each section below.

Mitigation measures which are made a part of the project (e.g: permit condition) or which are required under a separate Mitigation Measure Monitoring or Reporting Plan which either avoid or reduce impacts to a level of insignificance are identified in the analysis within each section.

1. Aesthetics

Dow's Pittsburg facility is located in an industrial corridor along the southside of New York Slough and the San Joaquin River. To the south of the Pittsburg facility is undeveloped land owned by Dow, bordered on the south by a band of commercial and light industrial activity. The area has been characterized by extensive industrial and transportation-related activities. Because the landscape in the vicinity of the project is primarily industrial, visual sensitivity to the project is considered low. The existing HAF units are located in the interior of the Pittsburg facility and are surrounded on all sides by other process units. The stacks, the tallest components of the HAF units, are about 85 feet and 88 feet. The height of the HAF stacks is consistent with the heights of surrounding process units and, as a

result, the HAF units are indistinguishable from background conditions at the facility. Night lighting for the HAF units is similar in height, intensity, and number to the standard industrial facility lighting or surrounding process units. No scenic highways are located near the facility and the facility does not impair scenic resources or pose a substantial adverse effect on a scenic vista.

Conclusions: The proposed project will not change the existing visual character or aesthetics of the site or surroundings.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.M)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact
- ☒ No Impact **X**

2. Agricultural Resources

No agricultural activity takes places within one mile of the Pittsburg facility and there is no land under Williamson Act contract in the vicinity of the project site.

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact
- ☒ No Impact **X**

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California.

3. Air Quality

3.1 Air:

Temperatures in the Pittsburg-Antioch area are generally mild, with average annual precipitation of 12.5 inches. The prevailing winds are westerly. The region around the Pittsburg facility is in attainment for federal particulate matter (PM10) standards, state and federal sulfur dioxide standards, nitrogen dioxide (NO_x), carbon monoxide, and lead standards, and state sulfate standards. The region around the Pittsburg facility is in non-attainment for the state PM10 standard and for state and federal ozone standards. However, the Bay Area Air Quality Management District (BAAQMD), in conjunction with the California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (U.S. EPA) is actively engaged in implementing region-wide programs intended to move the area into attainment with these standards.

The two HAF units currently operate under their respective BAAQMD permits that contain specific conditions and limitations. The emissions of criteria pollutants from the HAF units, and the BAAQMD permits themselves will not change as a result of this project. The on-going regulatory programs are reducing emissions of NO_x and volatile organic compounds. This project will not conflict with or obstruct the implementation of any air quality plan, cause a violation of any air quality goal or standard, or contribute substantially to the existing violation of any air quality standard.

The primary air contaminant of the HAF units is nitrogen oxides (NO_x). NO_x emissions from the two HAF units combined amount to approximately 2 tons per year. The BAAQMD permit limits these annual emissions to less than 5 tons per year (6194 pounds per year from the ST HAF and 3139 pounds per year from the MS HAF). These allowed emission levels are quite small when compared to the allowable air basin-wide NO_x emissions (over 500 tons per day) that are allowable under the District's planning process in order to attain the federal ozone standard.

Emissions of Hazardous Air Pollutants (HAPs) result from the operation of these two HAF units. These emissions have been measured during trial burns conducted on each HAF. HAP emissions will not change as a result of this project. HAP emissions from the two HAFs and estimated fugitive emissions from associated equipment were evaluated in a health risk assessment (HRA). The HRA was conducted in accordance with the DTSC-approved protocol (Health Risk Assessment Protocol for the Dow Chemical Company Halogen Acid Furnaces, Radian International, Feb. 1999).

3.2 Bay Area Air Quality Management District:

There are 304 permits from the Bay Area Air Quality Management District (BAAQMD) regulating emissions from various operations at the Dow Chemical Co. (Plant #31), including tank vents, fume hoods, and the halogen industrial furnaces. As of October 1999, there are 191 permitted sources and 113 exempt sources for manufacturing operations at the Dow Pittsburg site. The Dow Pittsburg site is designated as Plant #31 by BAAQMD.

References:

Permit to Operate, Plant # 31, Bay Area Air Quality Management District, September 2000.

3.3 Toxic Hot Spots: The Dow Pittsburg site is also subject to the Toxic Hot Spots legislation. Dow submitted an inventory and risk assessment associated with this legislation to the BAAQMD in January 1991. It should be noted that over the past ten years since Dow performed its original risk assessment pursuant to AB-2588 (the Air Toxics "Hot Spots" Information and Assessment Act), Dow has significantly reduced emissions of HAPs from its Pittsburg facility. These reductions have been achieved by the closure of two significant HAP emitting units (the Chlorine plant and the Chlorinated Solvents plant) and by installing state-of-the-art abatement equipment on existing units (such as the new refrigeration installation at the Dowicil plant, which significantly reduced emissions of methylene chloride and perchloroethylene).

3.4 Fugitive Emission Control: The Dow Pittsburg site is also subject to BAAQMD fugitive emission control rules which include Regulation 8 Rule 18 (Valves and Connectors) and Regulation 8 Rule 25 (Pump and Compressor Seals at Petroleum Refineries and Chemical Plants).

The two HAF units currently operate under their respective BAAQMD permits that contain specific conditions and limitations. In addition, the BIF interim status authorization requires compliance testing every three years, the most recent of which were conducted in 2001. In recent years, the HAF units demonstrated compliance with all conditions of their BIF interim status in those tests.

HAF units do not generate any detectable odors.

3.5 Compliance Test Burns:

The MS HAF operations have been regulated by Bay Area Air Quality Management District (BAAQMD) permit, since June 1973 and by the US EPA since the BIF rule became **law in 1991**. To demonstrate compliance with the applicable BIF rule regulations, Dow has submitted Certification of Compliance Test Reports for both MS HAF and ST HAF every three years since 1992. The latest compliance test reports for MS HAF and ST HAF were submitted on April 27, 2001, and May 31, 2001, respectively. These furnaces are currently operating under the directives identified in 2001 certifications.

References:

1. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Symtet Halogen Acid Furnace", May 31, 2001
2. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Symtet Halogen Acid Furnace", August 14, 1998
3. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Symtet Halogen Acid Furnace", August 17, 1995
4. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Symtet Halogen Acid Furnace", August 21, 1992
5. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Manufacturing Services, Halogen Acid Furnace", April 27, 2001
6. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Manufacturing Services, Halogen Acid Furnace", August 14, 1998
7. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Manufacturing Services, Halogen Acid Furnace", August 17, 1995
8. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Manufacturing Services, Halogen Acid Furnace", August 21, 1992

3.6 Trial Burn Plan:

In order to establish operating conditions for the MS HAF and ST HAF that meet the applicable BIF Rule regulations and to estimate actual emissions of constituents of concern for input into the health risk assessment, and to obtain a RCRA Part B Operating Permit, a Trial Burn Plan and Quality Assurance Project Plan (QAPP) were prepared in March 1999. The trial burn plan was designed to demonstrate that the MS HAF is capable of meeting the following emission standards and to gather actual emission levels of constituents for input to the HRA:

1. Particulate matter emissions will not exceed 0.08 grain per dry standard cubic foot (gr/dscf) corrected to 7% oxygen in the stack.
2. Carbon monoxide (CO) concentration in the stack gas, corrected to 7% oxygen on a dry basis, will not exceed 100 parts per million by volume (ppmv) on an hourly rolling average (HRA).
3. A 99.99 percent (%) destruction and removal efficiency (DRE) will be met for each Principal Organic Hazardous Constituent (POHC).
4. Emission limits proposed for metals based on modeled impacts to a hypothetical maximum imposed individual (MEI) and calculated public health impacts at this location
5. Hydrogen chloride (HCl) and chlorine gas (Cl₂) emission limits based on modeled impacts to the hypothetical MEI and BIF Rule Reference Air Concentrations (RACs).

References:

1. "Trial Burn Plan for The Dow Chemical Company Symtet Halogen Acid Furnace", September 1999
2. "Trial Burn Plan for The Dow Chemical Company Manufacturing Services Halogen Acid Furnace", September 1999
3. "Quality Assurance Project Plan for the Dow Chemical Company Manufacturing Services Halogen Acid Furnace", September 1999.
4. "Quality Assurance Project Plan for the Dow Chemical Company Symtet Halogen Acid Furnace", September 1999.

3.7 Trial Burn:

Trial burns were conducted between October 1999 and March 2000 to demonstrate that the MS HAF and Symtet HAF met the emission standards and to measure actual emission levels of constituents of concern. The MS HAF and Symtet HAF were operated under three different operating conditions and samples were collected over three runs for each condition; two additional runs were conducted under Condition 3.

In addition to demonstrating compliance with these emission standards, the trial burn testing has also identified and quantified the products of incomplete combustion (PICs). The trial burn has defined worst-case operating conditions for the MS HAF and ST HAF and has demonstrated that the units can meet emission standards for a wide range of operating conditions. These operating conditions have been established as permit conditions in the BIF permit.

References:

1. "Trial Burn Report for the Dow Chemical Company Manufacturing Services Halogen Acid Furnace", Volume 1, Text, January 2000
2. "Trial Burn Report for the Dow Chemical Company Manufacturing Services Halogen Acid Furnace", Volume 2 through 5, Appendices, January 2000
3. "Trial Burn Report for the Dow Chemical Company Symtet Halogen Acid Furnace", Volume 1, Text, July 2000
4. "Trial Burn Report for the Dow Chemical Company Symtet Halogen Acid Furnace", Volume 2 through 4, Appendices, July 2000

3.8 Health Risk Assessment:

The Dow Chemical Company has prepared a health risk assessment (HRA) to support the permit application for two HAFs at the Pittsburg, California facility. This HRA was prepared in accordance with procedures outlined in the documents titled "Health Risk Assessment Protocol for the Dow Chemical Company Halogen Acid Furnaces, The Dow Chemical Company 1999". The protocol was consistent with current USEPA and California Environmental Protection Agency guidance and was approved by DTSC. The two HAFs, Manufacturing Services (MS) and Symtet (ST), are used to thermally oxidize byproducts from the chemical manufacturing processes. Both HAFs have been in operation for approximately 20 years. Emission of target analytes, released from the HAFs, was evaluated in a trial burn program. Emission rate estimates of the target analytes from the trial burn program were combined with estimates of fugitive emissions from piping components associated with the HAFs and used as input for the HRA. The consolidated emissions were then combined with meteorological data collected over a five-year period to estimate the concentrations of target analytes

in the ambient air. These concentrations were then used to arrive at conservative, worst-case estimates of risks of adverse health effects.

The risk of adverse human health effects was evaluated under three exposure scenarios:

- (1) A maximum exposed individual (MEI) for residential receptors assuming an exposure period of 24 hours per day for 70 years and occupational receptors assuming an exposure period of 8 hours per day, 240 days per year for 46 years;
- (2) A reasonable maximum exposure (RME) for residential receptors assuming an exposure period of 24 hours per day for 30 years and occupational receptors assuming an exposure period of 8 hours per day, 250 days per year for 25 years; and
- (3) A six year old child in a residential setting.

Various state and local agencies provide different significance criteria for cancer and non-cancer health effects. For the proposed project, the DTSC guidelines provide the most stringent significance criteria for potential cancer and non-cancer health effect from project-related emissions. For carcinogenic health effects, an exposure is considered potentially significant when the predicted lifetime cancer risk exceeds the risk criteria specified in DTSC-approved health risk assessment protocol. For non-carcinogenic health effects, an exposure that affects each target organ is considered potentially significant when the total hazard index (HI) exceeds a value of 1.

DTSC is satisfied that the impact of the emissions of hazardous air pollutants (HAPs) from the HAF units on the health of the maximally exposed off-property receptor of those HAP emissions is below the level of significance for both cancer and non-cancer health effects. Thus, DTSC has determined that the potential impact of the HAP emissions from the proposed project is less than significant.

The incremental cancer risk as a result of a lifetime exposure to emissions from the HAF units (stack and fugitives) was estimated to be 1.49 in one million at the residential MEI and 0.75 in one million at the occupational MEI.

The maximum exposed individual for occupational cancer, chronic HI, and acute noncancer was located on the western border of the facility. The maximum exposed individual for residential cancer, and residential chronic HI was located 500 meters east of the facility.

The potential for noncancer effects due to chronic (long-term) exposure, if any, was evaluated for the point of maximum impact by comparing estimated daily dose rates with the most appropriate reference exposure level (REL). The results of the chronic noncancer health effects assessment indicate the hazard index (HI) values for each organ or system is less than 1.0. Chronic HI values less than 1.0 indicates that noncancer effects from chronic exposure to facility emissions are unlikely. The maximum chronic HI for a target organ or system was 0.3708 at the residential MEI and 0.6673 at the occupational MEI.

The potential for health effects due to acute (short-term) exposure was evaluated by comparing estimated maximum one-hour concentrations in air to the acute RELs. All noncancer acute HI values for each target organ or system are less than 1.0. Acute HI values less than 1.0 indicate that noncancer effects from acute exposure to emissions associated with the HAF units are unlikely. The maximum acute HI for a target organ or system was 0.1174. Based upon these estimated emission levels, DTSC has determined that the continued operation of the facility would not pose any significant threat to public health and environment.

Conclusion:

This environmental evaluation demonstrates that use of the existing hazardous waste HAF units will

not have any significant adverse impacts. Operational and design features such as contingency planning, inspection procedures, and training methods will continue to prevent impacts. Based on the findings of this Initial Study, there will be no significant adverse effects on human health or the environment as a result of this project.

References:

1. "Health Risk Assessment Protocol for the Dow Chemical Company Halogen Acid Furnaces", Radian International, Feb. 1999
2. "Health Risk Assessment for the Dow Chemical Company Halogen Acid Furnaces", July 2001.
3. "Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.E)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact **X**
- ☐ No Impact

4. Biological Resources

The HAF units are currently part of and are surrounded by an industrial facility. These sites have no vegetative cover and do not contain any wildlife habitat. Habitat in the vicinity of this Dow facility includes open water areas to the north in New York Slough and the San Joaquin River, wetlands associated with Browns Island and Winter Island approximately 1,000 feet offshore, and undeveloped uplands containing non-native grass cover to the east and south of the facility. Other industrial facilities are dispersed throughout these grassland areas.

Wildlife use of the Pittsburg facility is limited to very rare resting use by songbirds, ravens, and gulls. Because the HAF units are both located in the middle of the facility, it is unlikely that even resting birds or small rodents significantly utilize these areas. The wetlands area to the north and east of the facility are utilized by several species of resident water bird, winter migrants such as mallards and grebes, songbirds, muskrats, raccoons, and several small species of rodents. The upland area provides habitat for small rodents and jackrabbits. The aquatic environment in the New York Slough and the San Joaquin River supports a number of fish species and a diverse assemblage of invertebrates. These undeveloped habitats support some sensitive plant and animal life. There are no wildlife habitat areas within the plant itself, and industrial activities such as the HAF units do not physically displace habitat areas.

Conclusion:

Based upon current information available DTSC has determined that the proposed project would not pose any threat to the biological resources.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.G, Biological Resources)

Findings of Significance:

- ☐ Potentially Significant Impact

- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact
- ☐ No Impact **X**

5. Cultural Resources

Dow's Pittsburg facility is located on the edge of New York Slough in close proximity to the San Joaquin River. Although the California Office of Historic Preservation has not yet evaluated the site of the Pittsburg facility, no known cultural resource sites are located within the plant site.

Conclusion:

The Pittsburg facility is excessively developed. The process areas have been disturbed, and most areas are graded and paved. The HAF units are both located in the interior of the facility. There is no remaining natural habitat or unaltered land in either HAF process block. It is possible that subterranean disturbance associated with construction activities could reveal previously unknown cultural resource sites. However, since no construction activity will take place as a result of this project, the project will have no impact on cultural resources.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.N, Cultural Sources)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact
- ☐ No Impact **X**

6. Geology and Soils

The Pittsburg site is located in a seismically active area of Northern California. The known significant active faults and seismic sources within 50 miles of the site include the San Andreas, Hayward, Green-Valley-Concord, Calveras, Healdsburg-Rodgers Creek faults, and the Coastal Ranges-Sierra Block boundary zone. The Pittsburg facility is located in alluvial plain lowlands consisting of sandy clays, silty clays, and clayey silts with sand. Both HAF units have been graded and are level, paved, and surrounded on two sides by internal roads. The HAF units are not located in the 100-year floodplain. Although there are no mapped or active faults on the Pittsburg facility site, there are active earthquake faults in the Pittsburg-Antioch area. Based on previous soil investigations at the Pittsburg facility, there appears to be only a low to moderate potential for liquefaction and a low potential for a lateral spreading landslide at the site. The flat terrain also makes a flow landslide or substantial erosion unlikely.

6.1 Geology:

The Pittsburg site is located in a seismically active area of Northern California. The known significant active faults and seismic sources within 50 miles of the site include the San Andreas, Hayward, Green-Valley-Concord, Calveras, Healdsburg-Rodgers Creek faults, and the Coastal Ranges-Sierra Block boundary zone. The Pittsburg facility is located in alluvial plain lowlands consisting of sandy clays, silty clays, and clayey silts with sand. The HAF units are not located in the 100-year floodplain. Although there are no mapped or active faults on the Pittsburg facility site, there are active earthquake faults in

the Pittsburg-Antioch area.

Fault Rupture: There are no known active faults that traverse the site. As such, surface fault rupture is not expected at the site.

Ground Shaking: As a result of proximity to several faults in the region the site is expected to experience strong ground motion as a result of moderate size earthquake in the vicinity or a major strong motion earthquake with an epicenter located some distance away.

Liquefaction: Liquefaction is a temporary loss of strength in saturated granular soils caused by the buildup and maintenance of high pore-water pressure as a result of cycle ground vibrations that occur during earthquake shaking. This phenomenon can occur in saturated, loose to medium dense sands which are relatively clean. Potential for liquefaction of sands within the bay deposit exists at a few locations.

Seismic Settlement: In accordance with geotechnical reports, localized densification could develop from soil liquefaction within the areas defined by the bay deposit boundaries and resulting surface settlements could be as much as 2% to 5% of the thickness of the liquefied soil layer. Because the thickness of saturated, loose to medium dense sands varies at site, structures not supported on piles can experience significant differential settlement.

Tsunami: Possibility of any damage to the facilities as a result of flooding caused by tsunami (seismic sea wave) is not anticipated as the site is some distance away from sea shore and is generally 13 feet above mean sea level.

Landslides: The Pittsburg site has some areas not associated with Risk Management Plan (RMP) and California Air Resources Board (CARB) regulated processes, that are close to the water front and are susceptible to landsliding. Dow keeps a close watch and remedial actions are taken on a proactive basis. However, since the two HAF units are not located in these areas that are susceptible to landsliding, the proposed project will have no impacts in connection with this potential geotechnical hazard.

Subsidence: There is some evidence of subsidence at the site. Inspections of Risk Management Plan (RMP) and California Air Resources Board (CARB) regulated processes include evaluation criteria for subsidence and Dow has practice in place to render suitable maintenance should subsidence be determined to be significant.

Conclusions:

As part of the health risk assessment (HRA), an evaluation of potential risks associated with releases that might occur as the result of an earthquake was made. This accident analysis determined that the releases of any constituent of concern to a maximum exposed individual were less than significant.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.C, Geology)

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section IV, Potential Environmental Impacts)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☒ Less Than Significant Impact **X**

- ☐ No Impact

7. Hazards and Hazardous Materials

7.1 Hazardous Waste Treatment:

Dow Pittsburg treats two types of listed (as defined by USEPA 40 CFR 261) wastes in the HAF units: F002 wastes and U-listed wastes. F002 wastes are spent solvents that contain a minimum of 10% by volume of specified halogenated solvents. Those halogenated solvents include solvents such as methylene chloride, tetrachloroethylene (perchloroethylene), and carbon tetrachloride used for cleaning equipment, tank, and containers.

U-listed wastes are discarded commercial chemical products or intermediates, off-specification species, container residue and spill residue of certain chemicals. The following are estimated annual quantities of the hazardous wastes that are treated in the HAFs:

- (1) Dowicil Waste Solvent (F002), 210 tons,
- (2) Spent Solvents from Dow Pittsburg processes (F002), 77 tons,
- (3) Discarded Commercial Product - methylene chloride, 1 ton,
- (4) Discarded Commercial Product, 1,3-dichloropropene, 1 ton,
- (5) Discarded Commercial Product, tetrachloroethylene, 1 ton,
- (6) Discarded Commercial Product, carbon tetrachloride, 1 ton,
- (7) Discarded Commercial Product, methyl chloroform, 1 ton,
- (8) Discarded Commercial Product, trichloroethylene, 1 ton,
- (9) Mixture of Discarded Commercial Products (methylene chloride including 1,3-dichloro-1-propene, tetrachloroethylene, tetrachloromethane, methyl chloroform, trichloroethylene), 1 ton,
- (10) Symtet Tars (solid chlorinated pyridines) (carbon tetrachloride), 1200 tons,
- (11) Symtet Liquids (liquid chlorinated pyridines) (arsenic including barium, D006, chromium, lead, mercury, selenium, carbon tetrachloride, hexachlorobenzene, hexachloroethane, tetrachloroethylene), 50 tons,
- (12) Process Water Organic Liquid (carbon tetrachloride including chloroform, 1,2-dichloroethane, hexachlorobenzene, hexachlorobutadiene, hexachloroethane, tetrachloroethylene, trichloroethylene), 3 tons,
- (13) Groundwater Organic Liquid (carbon tetrachloride including chloroform, 1,2-dichloroethane, hexachlorobenzene, hexachlorobutadiene, hexachloroethane, tetrachloroethylene, trichloroethylene), 3 tons,
- (14) MS Distillation System Liquid (arsenic including cadmium, chromium, lead, mercury, selenium, carbon tetrachloride, chloroform, hexachlorobenzene, hexachlorobutadiene, hexachloroethane, tetrachloroethylene), 500 tons,
- (15) Dow Pittsburg Process Drum Wastes (arsenic including cadmium, chromium, lead, mercury, selenium, carbon tetrachloride, chloroform, 1,2-dichloroethane, hexachlorobenzene,

hexachlorobutadiene, hexachloroethane, tetrachloroethylene), 5 tons,

(16) Symtet Liquid Organics (carbon tetrachloride including chloroform, tetrachloroethylene), 34 tons,

(17) Carbon Tetrachloride Utility Fluid (carbon tetrachloride including chloroform, tetrachloroethylene), 34 tons,

(18) Manufacturing Services Vapor Abatement Liquid (carbon tetrachloride including tetrachloroethylene, trichloroethylene), 1 ton,

(19) Chlorinated Hydrocarbon Liquid (carbon tetrachloride including chloroform, hexachlorobenzene, hexachlorobutadiene, hexachloroethane, tetrachloroethylene, trichloroethylene), 3 tons, and

(20) Tetrachloroethylene Utility Fluid (carbon tetrachloride including hexachloroethane, tetrachloroethylene), 51 tons.

In addition to treating chlorinated hazardous wastes, the HAF units serve as vent abatement devices for gaseous process vent streams.

ST HAF vent streams that are treated include:

(1) Symtet Process Vent (hydrogen chloride, chlorine, nitrogen, carbon tetrachloride), approximately, 300 lb/hr,

(2) Dowicil Process Vent (methylene chloride, nitrogen), approximately, 25-62 lb/hr,

(3) Tar Tank Vent (nitrogen, chlorinated pyridines), less than 5 lb/hr,

(4) 600/700 Block Tank Vent (MS HAF Backup Vent), (nitrogen, carbon tetrachloride, methylene chloride, tetrachloroethylene) less than 30 scfm (standard cubic feet per minute),

(5) MS HAF Water Plant Backup Vent (nitrogen, carbon tetrachloride, tetrachloroethylene, 1,2-dichloroethene, methylene chloride), 0-50 scfm,

(6) Latex Process Vent (MS HAF Backup Vent) (nitrogen, butadiene, styrene, methane), < 0-15 scfm,

MS HAF gaseous vent streams that are treated include:

(1) Distillation Vent (carbon tetrachloride, chlorine, hydrogen chloride), 100-200 lb/hr,

(2) HCl Vent (hydrogen chloride, nitrogen),

(3) Chlorine Vent (chlorine),

(4) 600/700 Block Tank and Carbon Tetrachloride Tank Truck/Tank Car Loading Vent (nitrogen, carbon tetrachloride, methylene chloride, tetrachloroethylene), 0-30 scfm,

(5) 400/520 Block Process Vent (nitrogen, carbon tetrachloride, tetrachloroethylene, 1,2-dichloroethene, methylene chloride,

(6) 600 Block Process Vent,

(7) Catacid Process and HCl Tank Car/Tank Truck Loading Vent,

(8) Latex Process Vent,

(9) Membranes Process Vent,

(10) Groundwater (B-250) Air Stripper Process Vent, and

(11) Catacid Process Vent.

The trial burns have demonstrated that these HAF units have destruction and removal efficiencies (DREs) greater than 99.99%. Due to the nature of process vent streams, instantaneous compositions of the constituents and flow rates vary.

References:

1. "BIF Part A and Part B Permit Application for the Dow Chemical Company Halogen Acid Furnaces", December 2000, (Section 3, Hazardous Waste Process Vent Streams)

7.2 Residue Management:

The ST and MS HAF reactors and air pollution control systems may occasionally have residual solid materials. If present, this material is removed during scheduled maintenance turnarounds. It is analyzed for hazardous characteristics and disposed of appropriately accordingly to the analytical results.

Conclusions:

The proposed Hazardous Waste BIF Permit would ensure that these operations will be conducted in a manner protective of human health and the environment. There will be process controls and emergency procedures in effect. There are mechanisms identified in the Operation Plan that ensures that the facility will operate within parameters of its Operation Plan. In the unlikely event that unsafe conditions, specified in the permit conditions, should occur, the hazardous waste feed to the unit will automatically be cutoff and emissions from the units will be discontinued. The mechanisms include Training Plan, Contingency Plan, and onsite emergency response. The Permit requires scheduled inspections of the facility equipment and operation. DTSC conducts both periodic and unannounced inspections to ensure the compliance with current standards.

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☒ Less Than Significant Impact X
- ☐ No Impact

8. Hydrology and Water Quality

The Dow Pittsburg facility is located in the Pittsburg groundwater basin that extends from the hills south of the facility to the western portion of the Sacramento-San Joaquin River delta in the north, and from the vicinity of Bay Point in the west to the City of Antioch in the east. The basin is filled with unconsolidated fluvial and alluvial sediments deposited in the Sacramento-San Joaquin River delta and in alluvial fans formed by streams draining the hills south of the facility. Groundwater at the Dow facility is encountered at depths varying from approximately 2 to 13 feet below ground surface (bgs).

The subsurface has been divided into three aquifer intervals generally composed of sand and silty sand. The aquifer intervals are referred to as the water table interval (2 to 25 feet bgs), the mid-depth interval (30 to 75 feet bgs), and the deep interval (80 to 130 feet bgs). Regionally and at the site, a clay interval is found from 130 feet to 800 feet bgs. In the southern portion of the facility, the deep and

mid intervals are not separated by a clay layer and are composed of mostly sand. North of 2nd Street, along New York Slough, aquifer intervals are separated by clay-layers. The aquifer intervals in the north are thinner and consistently finer-grained than those in the southern part of the facility.

Surface water bodies near the Pittsburg plant include the New York Slough, Kirker Creek, and marshy areas adjacent to the New York Slough. Most stormwater runoff within the facility is collected, monitored and pH-adjusted before release into New York Slough, including non-contact stormwater runoff from the HAF sites. Stormwater discharges into the New York Slough are consistent with applicable water quality standards. All stormwater falling on the process area of the HAF unit is recovered and utilized in the process. No untreated process water is discharged into the slough.

Previous groundwater monitoring in the area indicates that the groundwater is present over most of the Dow property beginning at shallow depths of about ten feet and extending down at least two lower water-bearing zones. There is no contiguity between underlying groundwater and process water from the HAF units or storm water falling on the HAF units.

The project will have no adverse impact on water quality or water resources and will not cause violation of any applicable water quality goal or standard.

Waste Discharge Requirements:

The Dow Pittsburg facility is currently regulated by the Board under Waste Discharge Requirements (WDR) and NPDES Permit No. 98-059. A Corrective Action Schedule of Compliance is contained in the Hazardous Waste Facility Permit (EPA ID Number: CAD 076528678) issued by DTSC in 1996. The Board is serving as the lead agency to implement and enforce RCRA corrective action at the Dow facility pursuant to Health and Safety Code Section 25204.6(b).

Toxic Pits Cleanup Act:

In December 1985, a Hydrogeological Assessment Report (HAR) was submitted to RWQCB in response to Toxic Pits Cleanup Act (TPCA) of 1984.

Conclusions:

The HAF units are both located within the main process area of the facility, which is graded and paved. The HAF units are located in an area of the facility where earlier process units had been located. Operation of the HAF units does not substantially alter the previous drainage patterns in the facility. Previous groundwater monitoring in the area indicates that the groundwater is present over most of the Dow property beginning at shallow depths of about ten feet and extending down at least two lower water-bearing zones. There is no contiguity between underlying groundwater and process water from the HAF units or storm water falling on the HAF units. Thus, there is no significant threat of impact on existing groundwater through discharge or recharge. The area surrounding both HAF units is fully paved and curbed to avoid any runoff. Stormwater falling on the paved area of the facility is channeled and recovered for use in production process at Dow. The HAFs produce very little to no process wastewater; the quantity that is produced is pumped into the product acid tank. The project will not result in changes or increases in current wastewater or stormwater collection and treatment methods. Thus, the HAF units pose no threat of intentional or unintentional discharge to either surface or groundwater. Moreover, the current water consumption of the HAF units will not change, such that the project will not have any impact on the amount of ground or surface water available for public or other beneficial use.

References:

"Waste Discharge Requirements Order No. 98-059", California Regional Water Quality Control Board, San Francisco Bay Region.

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.D, Water)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☒ Less Than Significant Impact **X**
- ☐ No Impact

9. Land Use and Planning

The Pittsburg facility is zoned for industrial use that is consistent with both the City of Pittsburg and Contra Costa County General Plans. No agricultural activity takes place within one mile of the Pittsburg facility.

Conclusion:

The proposed project will not result in additional construction on the site of two HAF units, which have been in operation for 20 years, or a change in land use. The project will not impact nearby residential areas in Pittsburg and Antioch; the nearest residences are approximately one mile from the proposed project.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.A, Land Use/Planning)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☒ Less Than Significant Impact **X**
- ☐ No Impact

10. Mineral Resources

The Contra Costa General Plan identifies areas of mineral resources of value to the region or to residents of the State. No areas of mineral resources are identified in the Pittsburg-Antioch area. California Division of Minerals and Geology (CDMG) classifies the site of the Pittsburg facility within Mineral Resources Zone 1 (MRZ-1), indicating the adequate information suggests that no significant mineral deposits are present and there is little likelihood for their presence.

Conclusion:

DTSC has determined that the proposed project would not pose any threat to the mineral resources.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.H)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact
- ☒ No Impact X

11. Noise

Onsite noise limits for occupational exposure is regulated at 90 dBA over eight hours. Dow's standard procedures is to issue vendor specifications for each major piece of equipment ensuring that the noise rating for the equipment does not exceed 85 dBA at a point of generation. Sound attenuation control mechanisms are installed as necessary to meet this standard. The typical noise exposure in the Pittsburg site ranges from about 70 to 85 dBA, depending upon the location inside the facility. None of the HAF units exceed 85 dBA at a point of generation. Noise rating for all equipment and/or area is below the 90dBA threshold and personnel noise monitoring is below the 85 dBA TWA maximum.

Conclusion:

DTSC has determined that the proposed project would not create any additional noise.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.J)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact
- ☒ No Impact X

12. Population and Housing

The project does not include new business or infrastructure development or provide the type of product that might induce growth in the region directly or indirectly. It will therefore have no impact on population or housing.

Conclusion:

DTSC has determined that the proposed project would not induce any growth in the area or region.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.B)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact
- ☒ No Impact X

13. Public Services

Dow's Pittsburg facility maintains onsite emergency response and security staff capable of responding to fires or other hazards at the facility. As a result, the project will not impact response times of local fire or police departments, nor will the project require expansion of current fire and police facilities or construction of new facilities. Because the operating parameters and conditions of the HAF units will not change, the project will not require an increase in employees and will not directly or indirectly induce growth in the surrounding communities.

Conclusion:

DTSC has determined that the proposed project will not affect schools, parks and recreational facilities, or other public facilities.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.K)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact
- ☒ No Impact X

14. Recreation

The recreational facilities near Pittsburg facility include the following:

- (1) Fairview Park in Antioch, about 1-mile east,
- (2) Central Park in Pittsburg, about 2-miles west,
- (3) Prosserville Park in Antioch, about 1-mile east,
- (4) Marina Park in Antioch, about 1.5 miles northeast,
- (5) Contra Loma Regional Park in Antioch, about 4 miles southeast, and
- (6) Browns Island Regional Shoreline, about 1.5-mile northeast.

Conclusion:

The project will not involve construction of new process units or a change to current operating conditions, no new employees will be needed. DTSC has determined that the proposed project will not induce growth and will not increase demand at nearby recreation facilities or create a demand for new recreational facilities.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.O)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact
- ☒ No Impact **X**

15. Transportation and Traffic

Access for tank trucks bringing material into and out of the Pittsburg facility is provided via State Route 4 ("SR 4"), a four-lane divided freeway, to Loveridge Road, a paved four-lane industrial collector road which leads directly into the facility. Both SR 4 and Loveridge Road carry existing traffic volumes below their maximum capacity. Truck traffic volume along SR 4 in the project area and along Loveridge Road constitutes approximately 7% to 9% of total volume.

Conclusion:

DTSC has determined that proposed project would not increase the number of vehicle or rail trips to or from the Pittsburg facility.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.F)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact
- ☒ No Impact **X**

16. Utilities and Service Systems

The utility requirements of the HAF units will not change as a result of the proposed project. All utilities, except compressed air and some of the water resources, required for the HAF units are provided to Dow by others. The existing capacity of utilities being supplied to Dow is sufficient to meet the operating requirements for the HAF units. An onsite power plant owned and operated by a non-Dow entity is fueled by an onsite natural gas system. This power plant provides electricity, steam, and condensate to the HAF units. Wastewater and stormwater are collected and treated onsite. The project will not increase the amount of wastewater or stormwater generated by the HAF units. Any increases in the volume of wastewater or stormwater are absorbed by Dow's capacity. As a result, no expansion of public treatment facilities, storm drainage system, or other collection facilities will be required.

Conclusion:

DTSC has determined that proposed project would not pose any threat to the utilities and service systems.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.L)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact
- ☒ No Impact X

17. Risk of Upset

17.1 Accident Analysis:

Pursuant to the requirements of California Health and Safety Code Division 20, Chapter 6.95, Article 2 (commencing with Section 25255.31) an accident analysis, following the Risk Management Program (RMP) and California Accidental Release Prevention (Cal-ARP) regulations, was performed. The failure of the distillation vent stream, which contains 70% chlorine by weight, was identified as a worst-case plausible accident at either HAF unit (composition of the vent stream was assumed to be 100% chlorine). Results of this analysis indicate that the downwind distance to the chlorine Emergency Response Planning Guidelines Level 2 (ERPG-2) toxic endpoint is less than the distance to the nearest receptor. Therefore, exposure at the nearest receptor to emissions from an accident is unlikely to result in adverse health effects.

An accident analysis was performed as part of the health risk assessment (HRA) conducted to support the Part B Permit application and examined the potential for acute health effects. For consideration purposes, Dow has identified a plausible worst case accident to be a process vent line failure (i.e., shearing of the line). This failure would be caused either by some mechanical means (e.g., heavy equipment accident) or by an earthquake. Because the process vent line material has a high chlorine content, it is likely that such a failure would be detected quickly. Dow's onsite Emergency Response Team would be able to isolate the process vent line quickly, so any release is limited to no more than a 5 to 10 minute duration.

17.2 Operations and Wastestreams:

Regulated processes are regularly analyzed to identify and evaluate hazards associated with the operation that may impact the safety of Dow employees, the community, and the environment. Dow performs Process Hazard Analyses (PHAs) on regulated processes with one objective being to identify hazards, credible human errors and/or equipment failures that could lead to an accidental release. Dow personnel evaluate the likelihood and/or consequence of various scenarios; determine if existing chemical specific prevention steps/controls are adequate, and, where existing controls are inadequate, identify additional steps that can be taken to control the hazard. Dow also consults with Contra Costa Health Services on PHA methodologies best suited for periodic reviews of regulated processes.

17.3 Seismic Assessment:

Dow also conducts seismic assessments of regulated processes on a periodic basis as a part of the overall PHA methodology. Dow's seismic performance objective is to maintain structural integrity

during and after a seismic event. This means ensuring that the source maintains position by means of positive anchorage and ensuring that there are no major internal source failures that would allow for major spills or leaks. As a backup, the spill containment systems designed for accidental spills during normal operations typically are also designed to maintain structural integrity during a seismic event. As part of the preparation of Dow's RMP, Dow is performing seismic evaluation of each unit or piece of equipment that could cause a release of an acutely hazardous substance. Subsequently, Dow will upgrade any equipment that does not meet the requisite seismic criteria to withstand a reasonably foreseeable seismic event. Both BIFs will be evaluated during this process and will be upgraded if necessary.

Conclusion:

Dow has implemented a program of regularly evaluating and analyzing the potential hazards associated with the operation of its facility. In conjunction with DTSC, BAAQMD, and local agencies, Dow has established a program to reduce the risks of process unit upset, as well as its emergency response procedures. Therefore, DTSC has determined that the potential environmental impact of any process upsets or unintended emergency releases from either of the HAF units is less than significant.

References:

1. "Health Risk Assessment for the Dow Chemical Company Halogen Acid Furnaces", September 2000, Section 6.0 Accident Analysis
2. "Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.I, Hazards)
3. "BIF Part A and Part B Permit Application for the Dow Chemical Company Halogen Acid Furnaces", December 2000, (Volume 2, Appendix D, Seismic Report)
4. "BIF Part A and Part B Permit Application for the Dow Chemical Company Halogen Acid Furnaces", December 2000, (Volume 2, Appendix F, Site and unit Emergency Contingency Plans)
5. "BIF Part A and Part B Permit Application for the Dow Chemical Company Halogen Acid Furnaces", December 2000, (Volume 2, Appendix F, Specialty Chemicals Emergency/Contingency Plan)
6. "BIF Part A and Part B Permit Application for the Dow Chemical Company Halogen Acid Furnaces", December 2000, (Contingency Plan and Emergency Procedures, Section 8)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☒ Less Than Significant Impact **X**
- ☐ No Impact

18. Public Safety

Dow Pittsburg facility will operate its hazardous waste units per approved Operations Plan. This plan includes an approved health risk assessment incorporating accident analysis and risk of upset. These documents provide data that indicates that this facility can operate in compliance with all applicable health and safety requirements.

Dow Pittsburg facility has process controls and emergency procedures in place. There are mechanisms identified in the Operation Plan that ensures that the facility will operate within parameters

of its Operation Plan. In the unlikely event that unsafe conditions, specified in the permit conditions, should occur, the hazardous waste feed to the unit will automatically be cutoff and emissions from the units will be discontinued. The Permit requires scheduled inspections of the facility equipment and operation. DTSC conducts both periodic and unannounced inspections to ensure the compliance with current standards. Dow has implemented a program of regularly evaluating and analyzing the potential hazards associated with the operation of its facility.

Conclusion:

The environmental evaluation and documentation supporting DTSC permit decision demonstrates that use of the existing hazardous waste HAF units will not have any significant adverse impacts. Operational and design features such as contingency planning, inspection procedures, and training methods will continue to prevent impacts. DTSC has determined that the proposed project would not threaten public safety.

References:

1. "Health Risk Assessment for the Dow Chemical Company Halogen Acid Furnaces", September 2000

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☒ Less Than Significant Impact **X**
- ☐ No Impact

19. Cumulative Effects

The HAF units, which are the subject of the proposed project, have been in operation for over 20 years. The issuance of the requested permit to these units will not change the current operating parameters of the HAF units and accordingly will not change the environmental setting in which the HAF units operate. Also, as discussed in the section above, the project will result in no significant adverse environmental impact on any of the environmental areas that must be covered in a CEQA analysis. Since the project itself will have no significant adverse environmental impacts, the projects, in combination with other approved, proposed, or reasonably foreseeable projects in the vicinity of the proposed project could not result in any significant cumulative impacts.

References:

- "Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section III.P)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☒ Less Than Significant Impact **X**
- ☐ No Impact

20. Mandatory Findings of Significance

The proposed project is the issuance of a ten-year RCRA treatment and storage permit for two HAFs units. These units have been in operation for over 20 years. When the HAF units receive a permit, they will continue to operate in the same manner as they have in the past. There will be no change to

the environment as a result of this proposed project. Currently, operation of the HAF units is environmentally beneficial because it allows Dow to handle the liquid waste feeding the HAFs in the most efficient method practicable, thus minimizing the adverse impacts associated with offsite disposal.

Failing to approve the project would adversely impact the environment because Dow would be required to cease the feed of chlorinated liquid waste streams to one or both HAF units. This would create several types of impacts as a result of changes to Dow's waste management practices. If the HAF unit cease to accept these feed streams, the hazardous waste materials now burned in the HAF units would need to be packaged and shipped out of state for disposal at an appropriately licensed treatment and disposal facility. The waste materials would be treated in a facility that may not have as stringent a destruction and removal efficiency as the BIF units. Air emissions could increase as a result. Offsite disposal of waste materials would increase the risks of releases during transport.

References:

"Environmental Assessment for The Dow Chemical Company HAF Units Final Part B Permit", August 2000, URS, Oakland, California (Section VI)

Findings of Significance:

- ☐ Potentially Significant Impact
- ☐ Potentially Significant Unless Mitigated
- ☐ Less Than Significant Impact
- ☐ No Impact

V. DETERMINATION OF APPROPRIATE ENVIRONMENTAL DOCUMENT

On the basis of this Initial Study:

- ☐ I find that the proposed project COULD NOT have a significant effect on the environment. A NEGATIVE DECLARATION will be prepared. **X**
- ☐ I find that although the proposed project COULD HAVE a significant effect on the environment, mitigation measures have been added to the project, which would reduce these effects to less than significant levels. A NEGATIVE DECLARATION will be prepared.
- ☐ I find that the proposed project COULD HAVE a significant effect on the environment. An ENVIRONMENTAL IMPACT REPORT will be prepared.

DTSC Project Manager Signature	Title	Date
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DTSC Branch/ Unit Chief Signature	Title	Date
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ATTACHMENT A
INITIAL STUDY
REFERENCE LIST
for
(Dow Chemical Co. Pittsburg)

1. BIF Part A and Part B Permit Application for the Dow Chemical Company Halogen Acid Furnaces,
Volume 1 of 3, December 2000

- 1.0 Site Identification
- 2.0 Site Description
- 3.0 Hazardous Waste and Process Vent Stream Characteristics
- 4.0 HAF Unit Description
- 5.0 Site Security
- 6.0 Waste Management Practices
- 7.0 HAF Unit Personnel Training Program
- 8.0 Contingency Plan and Emergency Procedures
- 9.0 Closure Plan
- 10.0 Financial Responsibility
- 11.0 Corrective Action
- 12.0 Environmental Compliance Activities

2. BIF Part A and Part B Permit Application for the Dow Chemical Company Halogen Acid Furnaces,
Volume 2 of 3, December 2000

- Appendix A: Waste Analysis Plans
- Appendix B: Hazardous Waste Tank Certification (ST HAF)
- Appendix D: Seismic Report
- Appendix E: Hazardous Waste Tank System Certification (MS HAF T-12)
- Appendix F: Site and Unit Emergency Contingency Plans
- Appendix: Specialty Chemicals Emergency/Contingency Plan
- Appendix: Manufacturing Services Emergency/Contingency Plan
- Appendix G: Financial Assurance and Liability Insurance
- Appendix H: Initial Study Checklist

Tables

- Table 1-1 General Facility Information
- Table 3-1 HAF Listed Hazardous Waste
- Table 3-2 HAF Characteristic Hazardous Wastes
- Table 3-3 ST HAF Hazardous Waste Liquid and Process Vent Feed Streams
- Table 3-4 MS HAF Hazardous Waste Liquid and Process Vent Feed Streams
- Table 4-1 Process Drawing Summary
- Table 4-2 Technical Specification Sheet Summary
- Table 4-3 Thermal Reactor Details
- Table 4-4 Natural Gas Feed Composition
- Table 4-5 Sampling Frequency
- Table 4-6 Process Monitors for ST HAF
- Table 4-7 Process Adjustments Summary
- Table 4-8 Thermal Reactor Details
- Table 4-9 Process Monitors for MS HAF
- Table 4-10 Sampling and Analysis Frequency
- Table 4-11 Process Adjustments Summary

Table 7-1 HAF Personnel Responsibilities and Qualifications
Table 9-1 Waste Type and Proposed Disposal or Treatment Facility
Table 9-2 HAF Closure Activities Schedule
Table 9-3 HAF Unit Cleanup Costs - ST HAF/MS HAF
Table 9-4 Storage Tank, Piping and Pump Cleaning Costs - ST HAF/MS HAF
Table 9-5 Analytical Costs - ST HAF/MS HAF
Table 9-6 Closure cost Summary
Table 12-1 Key Environmental Orders and permits for the Dow Pittsburg Site.

3. "Environmental Assessment for the Dow Chemical Company HAF Units Final Part B Permit", URS, August 2000
4. "Waste Discharge Requirements Order No. 98-059", California Regional Water Quality Control Board, San Francisco Bay Region.
5. "Permit to Operate, Plant # 31", Bay Area Air Quality Management District, September 2000.
6. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Symtet Halogen Acid Furnace", May 31, 2001
7. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Symtet Halogen Acid Furnace", August 14, 1998
8. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Symtet Halogen Acid Furnace", August 17, 1995
9. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Symtet Halogen Acid Furnace", August 21, 1992
10. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Manufacturing Services, Halogen Acid Furnace", April 27, 2001
11. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Manufacturing Services, Halogen Acid Furnace", August 14, 1998
12. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Manufacturing Services, Halogen Acid Furnace", August 17, 1995
13. "Federal Boiler and Industrial Furnace Compliance Test Report for the Dow Chemical Company Manufacturing Services, Halogen Acid Furnace", August 21, 1992
14. "Trial Burn Plan for The Dow Chemical Company Symtet Halogen Acid Furnace", September 1999
15. "Trial Burn Plan for The Dow Chemical Company Manufacturing Services Halogen Acid Furnace", September 1999
16. "Quality Assurance Project Plan for the Dow Chemical Company Manufacturing Services Halogen Acid Furnace", September 1999.
17. "Quality Assurance Project Plan for the Dow Chemical Company Symtet Halogen Acid Furnace", September 1999.
18. "Trial Burn Report for the Dow Chemical Company Manufacturing Services Halogen Acid Furnace", Volume 1 of 5, Text, January 2000

19. "Trial Burn Report for the Dow Chemical Company Manufacturing Services Halogen Acid Furnace", Volume 2 of 5, Appendices, January 2000
20. "Trial Burn Report for the Dow Chemical Company Manufacturing Services Halogen Acid Furnace", Volume 3 of 5, Appendices, January 2000
21. "Trial Burn Report for the Dow Chemical Company Manufacturing Services Halogen Acid Furnace", Volume 4 of 5, Appendices, January 2000
22. "Trial Burn Report for the Dow Chemical Company Manufacturing Services Halogen Acid Furnace", Volume 5 of 5, Appendices, January 2000
23. "Trial Burn Report for the Dow Chemical Company Symtet Halogen Acid Furnace", Volume 1 of 4, Text, July 2000
24. "Trial Burn Report for the Dow Chemical Company Symtet Halogen Acid Furnace", Volume 2 of 4, Appendices, July 2000
25. "Trial Burn Report for the Dow Chemical Company Symtet Halogen Acid Furnace", Volume 3 of 4, Appendices, July 2000
26. "Trial Burn Report for the Dow Chemical Company Symtet Halogen Acid Furnace", Volume 4 of 4, Appendices, July 2000
27. "Health Risk Assessment Protocol for the Dow Chemical Company Halogen Acid Furnaces", Radian International, Feb. 1999
28. "Health Risk Assessment for the Dow Chemical Company Halogen Acid Furnaces", July 2001.